Upper Columbia Salmon and Steelhead Hatchery Programs

Operated by the

Washington Department of Fish and Wildlife

Funded by

Chelan, Douglas, and Grant Public Utility Districts

Outline

- HCPs/Settlement Agreements
- Program Goals
- Production levels
- Monitoring and Evaluation
- Potential mitigation options

HCP for Wells, Rocky Reach, and Rock Island Dams

- Establish program goals
- Develop and implement a M & E Plan
- Hatchery production levels adjusted based on dam survival rates
- Tributary fund for habitat improvement projects
- Establishes mainstem survival standards

Supplementation Programs associated with ESA listed species

- Mitigate for unavoidable hydrosystem related mortality while supporting the recovery of ESA listed species by increasing the abundance of the natural adult population, while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity.

- Hatchery Programs: Chiwawa spring Chinook; White River spring Chinook; Wenatchee summer steelhead; Methow spring Chinook; Chewuch spring Chinook; Twisp spring Chinook; Methow steelhead; Okanogan steelhead; Nason spring Chinook

Supplementation Programs associated with non-ESA listed species

- Mitigate for unavoidable hydrosystem related mortality while increasing the abundance of the natural adult population, while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity. In addition, provide harvest opportunities in years when spawning escapement is sufficient to support harvest.

- Hatchery Programs: Wenatchee sockeye; Wenatchee summer Chinook, Methow summer Chinook; Okanogan summer Chinook

Harvest Augmentation Programs associated with non-ESA listed species

- Mitigate for lost productivity associated with inundation of habitat and provide salmon for harvest and increase harvest opportunities, while segregating returning adults from supplementation programs in Methow and Okanogan rivers.

- Hatchery Programs: Turtle Rock summer Chinook; Wells summer Chinook

2006 - 2012 Mitigation Production Levels

(Initial HCP Production levels)

Spring Chinook	
Chiwawa River (I)	672,000
Nason Creek (I)	250,000
White River (I)	150,000
Methow River (I)	184,000
Chewuch River (I)	183,000
Twisp River (I)	183,000

2013 Mitigation Production Levels

(Assumes 7% NNI for Chelan and Grant PUD)

Spring Chinook	
Chiwawa River (I)	298,853
Nason Creek (I)	125,518
White River (I)	74,714
Methow River (I)	83,231
Chewuch River (I)	83,231
Twisp River (I)	83,230

2006 - 2012 Mitigation Production Levels

(Initial HCP production levels)

Summer Chinook	
Wenatchee River (I)	1,255,510
Okanogan River (I)	834,230
Methow River (I)	583,260
Columbia River (S)	2,624,000
Yearlings	520,000
Subyearlings	2,104,000

2013 Mitigation Production Levels

(Assumes 7% NNI for Chelan and Grant PUD)

Summer Chinook	
Wenatchee River (I)	645,780
Okanogan River (I)	425,940
Methow River (I)	410,850
Columbia River (S)	2,424,000
Yearlings	320,000
Subyearlings	2,104,000

2006 - 2012 Mitigation Production Levels

(Initial HCP production levels)

Steelhead	
Wenatchee River (I)	400,000
Okanogan River (I)	130,000
Methow River (I)	320,000

2013 Mitigation Production Levels

(Assumes 7% NNI for Chelan and Grant PUD)

Steelhead	
Wenatchee River (I)	246,000
Okanogan River (I)	115,635
Methow River (I)	177,900

2006 - 2012 Mitigation Production Levels

(Initial HCP production levels)

Sockeye Salmon	
Wenatchee River (I)	645,760
Okanogan River[1] (I)	1,368,240

1/ Achieved though habitat improvement and/or hatchery production

2013 Mitigation Production Levels

(Assumes 7% NNI for Chelan and Grant PUD)

Sockeye Salmon	
Wenatchee River (I)	462,733
Okanogan River[1] (I)	879,307

1/ Achieved though habitat improvement and/or hatchery production

WDFW Management Objectives

- Programs operated consistent with hatchery program goals while meeting mitigation production levels
- Programs operated consistent with meeting VSP criteria

Spring Chinook (2000 – 2004)

Stock	NOBs	% HOR Sp. Gr.
Chiwawa	29%	56%
Methow	5%	91%
Chewuch	5%	75%
Twisp	34%	46%

Spring Chinook (2000 – 2004)

- Chiwawa
  - Reduce strays
  - Increase NOBs
- Methow
  - Increase NOBs
  - Reduce % Hatchery on spawning grounds

Steelhead (2000 – 2004)

- Wenatchee
  - % NOB = 38%
  - % Hatchery on Sp. Gr. = 49%
- Methow/Okanogan
  - % NOB = 13% (~25% since 2004)
  - % Hatchery on Sp. Gr. = 92%

Steelhead (2000 – 2004)

- Wenatchee
  - Increase NOBs
  - Reduce strays
- Methow
  - Increase NOBs
  - Reduce % Hatchery on spawning grounds
- Okanogan
  - Increase NOBs
  - Reduce % Hatchery on spawning grounds

Summer Chinook (2000 – 2004)

Stock	NOBs	% HOR Sp. Gr.
Wenatchee	86%	22%
Methow	56%[1]	39%
Okanogan	56%[1]	52%

1/ ~ 100% NOBs since 2004

Summer Chinook (2000 – 2004)

- Wenatchee
  - Increase SARs
  - Reduce strays
- Methow
  - Increase SAR
- Okanogan
  - Increase spatial distribution

Sockeye (2000 – 2004)

- Wenatchee
  - % NOB = 99%
  - % Hatchery on Sp. Gr. = 3%

Sockeye (2000 – 2004)

- Wenatchee
  - Increase survival of hatchery fish
- Okanogan
  - Skaha Reintroduction program
  - Increase survival of wild fish via flow management strategies
  - Increase available habitat

Monitoring and Evaluation

- All Chelan, Douglas, and Grant PUD funded hatchery programs (both integrated and segregated)
- Annual monitoring with a formal evaluation every five years (i.e., Adaptive Management)
- Production level adjustments every 10 years
- Plan must have quantifiable objectives
- Plan Components
  - Conceptual Plan (2005)
  - Statistical Design (2006)
  - Implementation Plan (2006)
- Wenatchee Basin is also part of the ISEMP funded by BPA

Demographic Objectives

Variable	Treatment	Control
Spawner abundance*	Supp. Pop.	Unsupp. Pop.
NORs*	Supp. Pop.	Unsupp. Pop.
NRR*	Supp. Pop.	Unsupp. Pop.
Juveniles per redd	Supp. Pop.	Unsupp. Pop.
Reproductive success	Hatchery	Wild
HRR	Hatchery	Survival Std.

* Preliminary power analysis indicates minimum detectable difference is very large and power is low.

Genetic Objectives

Variable	Treatment	Control
Genetic variation within	Current pop.	Donor pop.
Genetic variation between	Current pop.	Donor pop.
Effective pop. size	Current pop.	Total spawners
Stray rates	Brood year	< 5%
Stray spawner comp.	Within pop.	< 10%
Stray spawner comp.	Outside pop.	< 5%
Run timing	Hatchery	Wild
Spawn timing	Hatchery	Wild
Spawn distribution	Hatchery	Wild
Size and age	Hatchery	Wild

Ecological Objectives

Variable	Treatment	Control
Disease	Supp. Pop.	Unsupp. Pop.
NTTOC Abundance	Undefined	Acceptable impact
NTTOC Size	Undefined	Acceptable impact
NTTOC Distribution	Undefined	Acceptable impact

Immediate Challenges

- Reference stream constraints
  - Extensive hatchery influence throughout the Upper Columbia
  - Small population sizes
  - Habitat suitability criteria
  - Hatchery strays (acceptable levels)
  - Political fortitude (long term)
  - Mitigation responsibilities

Potential Spring Chinook Reference Streams

Stream	Hatchery strays	Pop. size	Habitat	Future mitigation
Entiat[1]	X			
Lost	X	X		
L. Wenatchee	X	X		
Nason	X			X
Naches			X	

1/ Potential spring Chinook and steelhead reference stream

Wenatchee Spring Chinook Reproductive Success Study

- Funded by BPA
- Collaboration between NWFSC and WDFW
- Multiple generations in duration (2004 – 2014)
  - Relative reproductive success of hatchery and wild
  - Comparison of life-history attributes
    - Run timing, spawn timing, spawning distribution
    - Age, size, fecundity, egg size, egg retention
    - Redd microhabitat characteristics
    - Survival to spawning
  - Relative fitness of hatchery Chinook after one generation in the natural environment

Upper Columbia Steelhead Reproductive Success Study

- Scheduled to begin in the near future
- Funded by Chelan and Douglas PUDs
- Multiple generations in duration
- Relative reproductive success of hatchery and wild
- Experimental design not yet determined

Mitigation Options for USFWS

- Wenatchee - Segregated
  - Spring Chinook (locally derived broodstock)
  - Summer Chinook (Wenatchee)
- Entiat - Segregated
  - Summer Chinook (Wells)
- Methow - Integrated
  - Spring Chinook
    - 33% wild fish in broodstock
    - Acclimation in spawning areas
  - Summer Chinook (Methow)
- Okanogan - Segregated
  - Spring Chinook (locally derived broodstock)

Estimated Chiwawa Juvenile Production

(Italics indicate values were estimated or derived from model)

Brood year	Hatchery	Wild
2000	47,104	50,066
2001	377,544	247,890
2002	149,667	184,279
2003	222,131	33,637
2004	450,000	*104,086*
2005	450,000	*119,619*
2006	*400,000*	*119,619*
2007	*400,000*	*119,619*
2008	*400,000*	*119,619*

Estimated Chiwawa Adult Returns

(Italics indicate values were estimated or derived from model)

Run year	Hatchery	Wild	Total	Surplus (>2531)
2006	1,690	1,118	2,808	277
2007	1,078	712	1,790	0
2008	1,910	635	2,545	14
2009	2,309	904	3,213	682
2010	*2,154*	*947*	*3,101*	*570*
2011	*2,064*	*947*	*3,011*	*480*
2012	*2,064*	*947*	*3,011*	*480*
2013	*2,064*	*947*	*3,011*	*480*
2014	*2,064*	*947*	*3,011*	*480*

Chiwawa Assumptions

- Hatchery harvest = 14%
- Wild and unclipped hatchery harvest = 12%
  - 2% sport and commercial;
  - 10% tribal
- Hatchery SAR = 0.6%
- Wild SAR = 0.9%
- 5% age-3;60% age-4; 35% age-5